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ABSTRACT

One answer to standardized testing is the direct and continuous measurement of performance. Direct, continuous naturalistic observation of behavior yields a great deal of information per assessment unit. The information is precise and because it is direct, there is no question that it represents a "true sample" of the target behavior, as there is when standardized testing is used. Mediators of behavior change (teachers and/or parents) and their consultants (e.g., the school psychologist) receive accurate, daily, almost immediate feedback concerning the efficacy of the behavioral strategy employed so that inappropriate or ineffective consequences may be altered rapidly. (A brief manual for recording behavior rates and a specific case study is described.) The use of behavior rates has been examined as it relates to nonacademic behavior, but there is an unlimited potential in such use for teacher training, teacher effectiveness, identification of student competence, and a host of other academically oriented areas. (Author)

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A PRECISE AND VALID MEASURE OF BEHAVIOR AND BEHAVIOR CHANGE IN THE CLASSROOM*

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Almost any article dealing with "the role of the school/clinical psychologist" suggests that most time-honored practices are ineffective, invalid and inconsequential. The function most maligned in these terms is that of the tester, especially as it is associated with diagnosing, categorizing, or labeling; more specifically as these practices are associated with the misclassification and misplacement of minority group children.

Furthermore, testing in most cases gives little information about current functioning (Bersoff, in press). Rather, it yields data about behavior in an optimum environment (one-to-one testing) but tells little about behavior as it occurs in the natural, or usual environment (the classroom). Two recent investigations (Haughton, 1966; Johnson, 1967) support the conclusions that; there is little relation between test data and classroom performance, teacher ratings are more affected by test scores than actual performance, objective test data in the form of IQ and achievement tests tend to highly overrate actual student performance in the classroom.

In addition, testing removes both the psychologist and the child from the classroom, thus restricting the psychologists's contact with a primary mediator of the child's behavior--the teacher. This isolates

the teacher from the information-gathering process and removes a major source of "antecedent conditions" and "reinforcing events" from consideration in a plan for behavior change. Thus, it is not surprising that the psychological report, which purports to explains the child's behavior and offer recommendations to the teacher is not widely read or valued by her (Good & Brophy, 1970; Lucas & Jones, 1970).

Given these criticisms, what alternate techniques are available. One answer lies in the direct and continuous measurement of performance. Direct measurement requires that behavior is viewed as it manifests itself in the child's behavioral repertoire rather than deducing a picture of the particular behavior from test results. Direct measurement takes place at the site where behavior naturally occurs. For most typical school functioning this means in the classroom (but does not exclude the playground, cafeteria, bus, etc.) Thus, measurement of daily academic performance is not deduced from intelligence or achievement tests but is obtained as the child actually performs. Continuous measurement allows for on-going monitoring of behavior through a period of time and can occur daily or for extended periods during the day.

Most testing procedures do not allow for frequent and continuous monitoring of behavior; rather they only tap short segments of behavior at widely spaced intervals. Tests are neither direct nor continuous measurements of performance. They are summaries of performance which usually yield data that does not match the routine classroom functioning of children.

There are many procedures that could be classified as direct and continuous measures, each with its limitations and specific purposes. Speciment recordings (Barker & Wright, 1955) lead to a continuous detailed narrative description of behavior as it unfolds. Every behavior is recorded and subsequent as well as antecedent environmental events noted. But, it is difficult to record every single behavioral event and the information, for statistical manipulation, still needs to be codified.

Many kinds of time-sampling formats (Amidon & Flanders, 1967; Good & Brophy, 1970; Madsen, Becker & Thomas, 1968) have been developed which encode the frequency of certain prespecified behaviors. The frequency of behavior is usually noted in terms of per cent of recorded time segments in which the coded behavior occurs. Encoding formats which use percentages, however, may yield misleading data. An example using such a format to record disruptive behavior (DB) will illustrate its deficiencies. After the operational definitions and coding conventions have been decided upon, the child is observed for a prescribed interval (e.g., 10 seconds) and DB noted. The mean frequency of DB is recorded as the number of intervals in which the DB occurs divided by the total number of intervals observed (e.g., 10 intervals in which DB occurred/20 total intervals = 50% DB). It is possible, however, that within each 10 second interval the duration of the DB may be from 1 to 10 seconds. Yet, at the end of the recording period the mean frequency of DB would be 100%. The percentage would indicate that the child was

disruptive without interruption throughout the observation session. In actuality, the DB may have consumed much less time than indicated. The mean DB of 100% would be a gross exaggeration of actual behavior. In addition to providing data which may be misleading, percentages have an artificial ceiling; percentages cannot go higher than 100 and pupils and teachers are thus denied information concerning changes in performance (Caldwell, 1966). Other defects of prevalent observational techniques are carefully reviewed by Weick (1968) and Wright (1960).

A method which overcomes the difficulties of most observational techniques has been developed by Lindsley (1964), and extended in application by his students (Haughton, 1966; Johnson, 1967; Koenig, 1967). This method allows for direct, continuous monitoring and representative recording of behavior. In recording, behavior rates (number of behavior/time), rather than percentages, are used. By using rate per minute and recording continuously rather than in preordained segments, an ongoing picture of the behavior emerges. Rates of behavior are not hampered by artificial ceilings and they have shown to be extremely sensitive to behavior change (see Case Report in this article for an example).

In addition to the development of behavior rate as a measure, Lindsley has devised a graphing technique to chart behavior rate allowing for pictorial monitoring of rate change over time. This technique, using semi-logarithmic graph paper enables the recorder to chart almost any behavior emitted by human beings from 1000th to 1000 movements per minute. The behaviors can be charted on one sheet for up to 140 successive days--or

the equivalent of one school semester. This procedure has been used in both special and regular classrooms (Caldwell & Cox, 1966; Haughton & Ericson, 1965).

A Brief Manual for Recording Behavioral Rates

Behavioral rates as measures have been applied to academic and non-academic behaviors. Up to the present its greatest use has been in the recording of daily, continuous academic performance, particularly in arithmetic and reading. In this procedure, the time is noted when a student begins and stops work on a piece of assigned work (e.g., a group of arithmetic problems). The ratio of number correct to time is calculated to yield a "rate correct" ($\frac{\text{number correct}}{\text{time}}$ = rate correct). The same procedure can be used for silent reading rate where the number of words per minute may be recorded.

The monitoring of these daily rates over a week provided information useful in designing remediation for an individual child or for individualizing the curriculum. Performance rates records have many additional academic uses from noting the effectiveness of student teacher to determining if the planned amount of work significantly exceeds or underestimates actual pupil working rate. For further explication of academic uses see Koenig (1967). The remainder of this manual will deal with the recording of nonacademic behavior and its applications in a behavior modification strategy.

As with any monitoring or modification procedure, the behavior to

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be observed and changed must be precisely defined. Too often with first attempts to record behavior, the target is identified not as a behavior but as a general category, such as "interpersonal openness." Even a category such as "openness", however, can be measured, recorded, and charted if it is precisely and functionally defined (e.g., (1) spontaneous verbalization, (2) smiling, (3) touching others, (4) spontaneous movement toward others, etc.). Whatever the definition, it is only after this kind of delineation that accurate monitoring of behavior can begin.

Secondly, the behavior to be recorded and eventually consequated should be observed over a wide range of situations and is best not limited to one or two days. Continuous and widespread observations yield information concerning the functional relationship between the behavioral repertoire and the situations which help evoke particular bits of behavior (cf., Bersoff & Grieger, 1970) with a consequent increase in the effectiveness of plans for behavior change. If one is interested in functioning restricted to one particular situation, then, of course, the observation and recording should take place in that situation.

Once the behavior has been delineated and observation initiated, recording begins. Careful noting of beginning and ending time of the recording period is essential. For behavior rates to produce an accurate picture of behavior, recording must be accurate as possible. Accuracy has been enhanced by the use of golf counters, knitting counters, or by placing tallies on paper as the behavior occurs.

Even elementary school children have been reliably trained to record their own behavior. However, this sometimes has dramatic effects on the behavior observed for self-recording has been shown to reduce behavioral excesses by an average 10 to 15 per cent. As this phenomenon may be expected, brief periods of observation by the teacher or psychologist may proceed the self-recording to note its effect. Summary sheets for recording nonacademic and academic behavior will be found in Figures 1 & 2.

The number of behaviors occurring in a given recording session are considered in relation to the amount of time in which they had an opportunity to occur. For example, if a child is out of his seat 40 times in a 30 minute recording session, his rate of "out-of-seat" behavior is 1.33 (40/30). All behavior rates are reduced to the common base of movements/minute so that comparison across activities can be made. Once the rates have been calculated, they can be charted on the six-cycle semi-logarithmic graph paper (Figure 3).*

The use of this graph paper to implement the concept of individualization can be illustrated with the following brief example. Let us assume that Child A has a baseline rate of "out-of-seat" behavior of 10/min. After a period of consequation is initiated, this is reduced to 5/min. Child B has a baseline rate of 2/min. and after a similar period of consequation the rate is reduced to 1/min. Note that the distance on the graph paper from 10 to 5 is equal to the distance of 2 to 1. Each child has controlled his out of seat behavior by one-half. Increases in academic behavior or behavioral deficits can be compared in the same way. Thus, equal per cent or proportional increases in performances are represented by equal distances (Koenig, 1967).

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*Available from Behavior Research Company, Box 3351, Kansas City, Kansas 66103 at $15.00 per 500 sheets.

Figure 1

Summary Sheet - Nonacademic Behavior

Teacher _____ Grade Level _____ Recorder _____ Inclusive Dates of Recording _____

Tagget Behavior _____ Terminal Behavior _____

Date/Time	Situation/Activity	Go	Stop	Total Time	Target Beh. Tally	Rate (M/M)	Terminal Beh. Tally	Rate (M/M)	Comments
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Figure 2

Summary Sheet - Academic Behavior

Teacher _____ Grade Level _____ Recorder _____ Inclusive Dates of Recording _____

	Date/Time	Assignment	Go	Stop	Total time	Number Possible	Rate M/M	Number Correct	Rate Correct (M/M)	Points*	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

*if token system in effect

DAILY BEHAVIOR CHART (DC-8)
6 CYCLE-140 DAYS (20 WKS.)
BEHAVIOR RESEARCH CO.
BOX 3351-KANSAS CITY, KANS. 66103

CALENDAR WEEKS

DAY MO YR

0 4 8 12 16 20

M W F

MOVEMENTS PER MINUTE

1000
500
100
50
10
5
1
.5
.1
.05
.01
.005
.001

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

SUCCESSIVE CALENDAR DAYS

SUPERVISOR ADVISER MANAGER

DEPOSITOR AGENCY

BEHAVER AGE LABEL MOVEMENT

CHARTER

The Use of Behavior Rates to Record Significant Behavior Change - A Case Report

The following case demonstrates the three major aspects of the technique we have been describing; the precise definition of the target and terminal behaviors, the obtaining of baseline data, and the use of the semi-logarithmic graph paper to serve as a visual aid and precise measure of behavior change.

Background Data. "Ann" was first tested when in kindergarten. Though only in school a short while, she had continual conflicts with her teachers and the school system because of generalized disturbing behavior. The psychologist who evaluated her noted that it was "impossible to keep this child in the testing room." Nevertheless, a Binet-obtained IQ of 63 (in the mildly or educably retarded range) was reported and on this basis Ann was assigned to an EMR class in the public schools. During the next three years, despite great emphasis on the acquisition of social skills (and the almost complete neglect of academic training) she continued to display behaviors labeled "unmanageable, devilish, out of control, and extremely disturbed." All three years in the EMR class were spent with the same teacher. By the end of the third year, Ann had become so notorious that the principal issued an ultimatum--"Shape her up or ship her out--the school can't survive three additional years of Ann." It was at this point that behavioral intervention began.

Phase I - Baseline Observation. Devilishness cannot be modified. It is only those behaviors which lead people to make the interpretive statement, "She is a devil" that can be modified. The definition of those target behaviors was done in two parts. First, the observer-consultant observed Ann's

classroom behavior during the times when the teacher felt it was most problematic. These were during the morning reading group and during the afternoon study period. The observer watched Ann's behavior for two hours each day, one hour in the morning and one hour in the afternoon. The major purposes of such observation were to see how Ann functioned in the naturalistic setting of the classroom and to develop some hypotheses concerning specific behavioral targets. Following two days of such observation, a teacher conference was held to further define the primary target. The teacher discussed her feelings about Ann and her behavior and decided that if Ann could stay in her seat or raise her hand for permission to leave her seat, she would feel a lot better about Ann and much classroom confusion would be reduced.

The teacher was unsure that any intervention techniques would work and continued to lobby for Ann's removal from the class. For this reason, the consultant carefully gathered baseline data which could be used for comparison purposes (given the success of the intervention) to demonstrate graphically to the teacher that Ann had, indeed, changed her behavior. Thirty observations, two per day as before, comprised Phase I. During this period, a student teacher carefully recorded the number of times Ann was out of her seat without permission (the target behavior) and the number of times she raised her hand and requested permission to do so (the final performance). The recording convention was, as described above, in terms of movements/minute. (see Figure 4, Phase I). During this time the median rate of "out of seat" behavior was 0.9/minute, or almost once a minute. This seems high but is actually an underestimate of the disturbance the teacher felt for in order for another out of

seat behavior to be recorded, Ann had to reseat herself. The observer noted in written comments that there were many days when Ann seemed to be continually out of her seat. The median rate for "asks permission" was 0.0/min. during baseline recording.

Phase II - Intervention. Phase II began in conference with Ann. She was told that her out of seat behavior was bothering her teacher and generally disrupting the class. She was shown the graph of her behavior and it was suggested that everyone might work together to get this behavior under control. Ann excitedly recommended that the best way to keep kids in their seat was to tie them in and she strongly urged the use of rope as most effective. Following her teacher's and the consultant's adamant refusal to tie her in her seat, Ann helped formulate a compromise. Ribbons of Ann's choice would be placed on her chair and if she so decided she could tie them across her lap to help her remember to stay seated. In addition, it was suggested that Ann might want to earn something for the time she spent in her chair and the times she requested permission before leaving her seat. After careful deliberation Ann stated that she would like to earn some time reading aloud to the student teacher. A system was mutually agreed upon whereby Ann would earn points for the time she spent in her seat that could be traded in for minutes of reading with the student teacher. Out of seat behavior would result in removal of points (Note the use of the techniques of prompting, positive reinforcement, individualization of reinforcement, and response cost).

Initially, the teacher was taught to tally the target and terminal behaviors and subsequently did so. But, because she was busy with other classroom matters,

it was decided to teach Ann herself the procedure. As a result, Ann took full charge for monitoring her own behavior. She recorded the time, tallied the points earned and lost and kept track of the points she had saved. Both the teacher and the observer-consultant did spot checks on Ann's records. At no time was she found to be inaccurate--when in charge of her own behavior she was precise and her recording impeccable. During this phase of the project, contingencies of reinforcement were manipulated, moving from a rich schedule to a leaner one (fading) with each change a joint decision involving Ann.

The graph (Figure 4) indicates that during the first five days of intervention Ann was still out of her seat, but at a reduced rate (from a median of 0.9/min. to a median of 0.009/min., or from approximately once a minute to once every hundred minutes). The behavior then dropped to zero beginning with the second school week of Phase II. The zero level is held at zero, despite a contingency revision beginning on day 32 (the start of the fading procedure) and is maintained until day 38. Here situational factors, a class birthday party, intervened quite expectedly to evoke a temporary reemergence of the target behavior. On the following day (Day 39) the zero rate is again maintained.

As the rate of target behavior was reduced, the rate of terminal rose (though the two were not reciprocal). From a base rate of zero during Phase I, Ann began to raise her hand to request permission to leave her seat at a median rate of approximately 0.2/min., which she maintained during Phase II.

Phase III - Followup. A reversal effect was not attempted in this intervention.

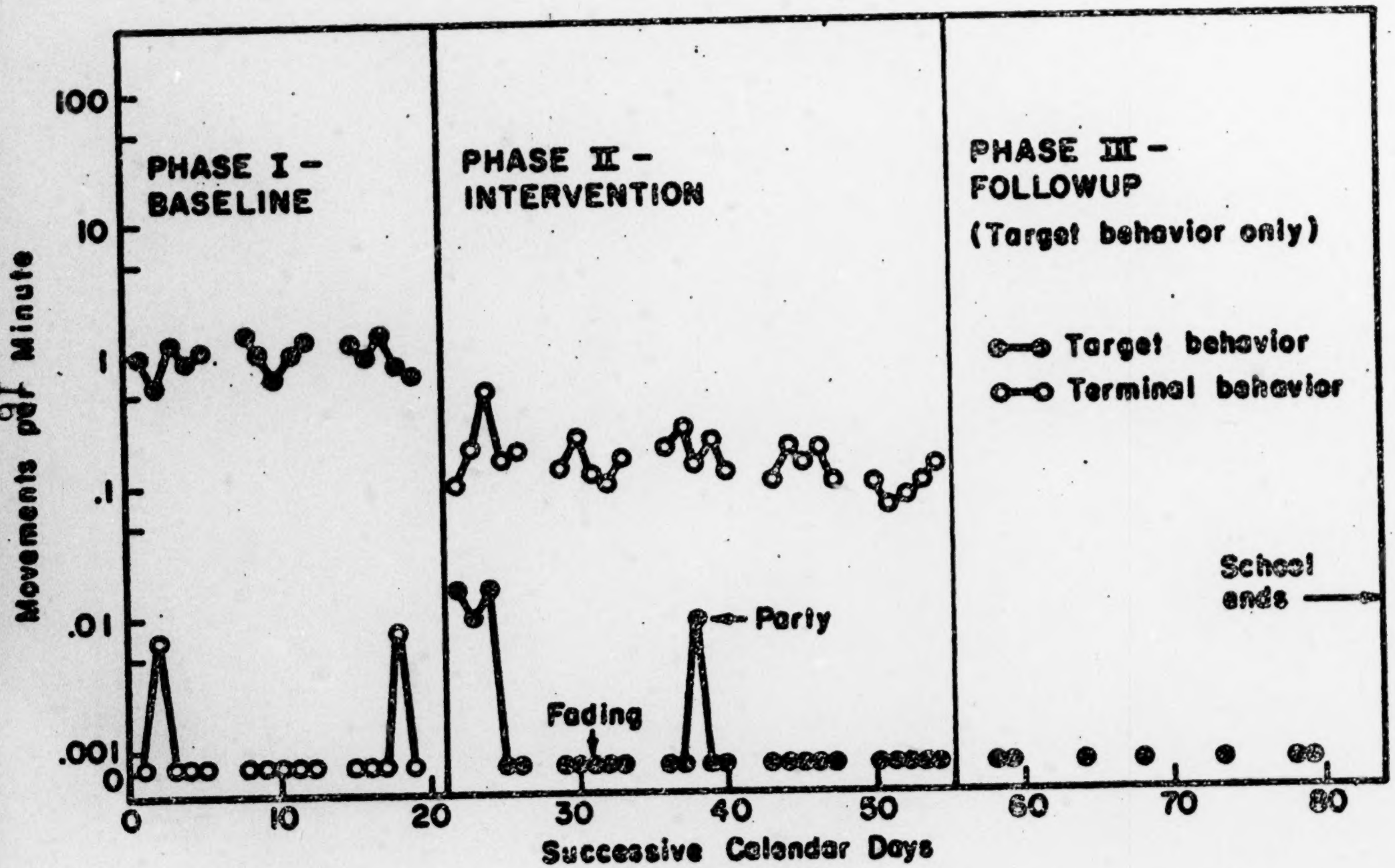
PHASE I - BASELINE
PHASE II - INTERVENTION
PHASE III - FOLLOWUP
(Target behavior only)
Target behavior
Terminal behavior
Movements per Minute
100
10
1
.1
.01
.001
0
Party
Fading
School ends
0
10
20
30
40
50
60
70
80
Successive Calendar Days

FIGURE 4

Contingencies continued to be altered until the points had been faded from Ann's environment. Spot checks by the consultant, the teacher and Ann indicated that the target behavior was being maintained at a zero level and continued to be so at the end of the school year at Day 85 (last spot check at Day 82).

Case Followup. The year following the intervention procedures, Ann was moved from the EMR program and placed in a class for children with learning and behavior disabilities. After the first six weeks of school she integrated into a regular third grade class for part of the school day. By semester's end, she was in the regular class full time, reporting to the special class only for short tutorial sessions. Ann's succeeding years in school have been in regular classes where she has been anaverage-to above average student. Intermittent help was available to all of Ann's teachers in the precise management of her behavior and further modifications took place, enabling Ann to continue to function well.

Conclusion

Direct, continuous naturalistic observation of behavior seems to provide many of the advantages one seeks in assessment. There is a great deal of information yielded per assessment unit. The information is precise and because it is direct, there is no question that it represents a "true sample" of the target behavior, as there is when standardized testing is used. Mediators of behavior change (teachers and/or parents) and their consultants (e.g., the school psychologist) receive accurate, daily, almost immediate feedback concerning the efficacy of the behavioral strategy employed so that inappropriate or ineffective consequences may be altered rapidly. And, while the use of behavior rates has been examined as it relates to nonacademic behavior, there is an unlimited potential in its use for teacher training, teacher effectiveness, identification of student competence, and a host of other academically oriented areas.

REFERENCES

Amidon, E. J. & Flanders, N. A. The roles of the teacher in the classroom. Minneapolis: Paul S. Amidon & Association.

Barker, R. G. & Wright, H. F. Midwest and its children: The psychological ecology of an American town. New York: Row, Peterson, 1955.

Bersoff, D. N. & Grieger, R. M. An interview model for the psychosituational assessment of children's behavior. American Journal of Orthopsychiatry, 1971, 41, 483-493.

Bersoff, D. N. The "current functioning" myth: An overlooked fallacy in psychological assessment. Journal of Consulting and Clinical Psychology,, 1971 (in press).

Caldwell, T. E. Comparison of classroom measures: Percent, number, and rate. Unpublished manuscript, Univ. of Kansas, 1966.

Caldwell, T. E. & Cox, L. Fourth-grade children tabulate, mark-score, and graph their daily arithmetic performances. Unpublished manuscript, Univ. of Kansas, 1966.

Good, T. L. & Brophy, J. E. Teacher-child dyadic interaction: A new method of classroom observation. Journal of School Psychology, 1970, 8, 131-138.

Haughton, E. Teachers and educational psychology: Grounds for divorce? Paper presented at the meeting of the Midwestern Psychological Association, Chicago, 1966.

Haughton, E. & Ericson, C. R. Why blame educators? Or how we learned to live with P. I. and still teach. Programmed Instruction, 1965, 5, 1-8.

Johnson, N. J. Daily arithmetic performance compared with teacher ratings, IQ, and achievement tests. Unpublished manuscript, Univ. of Kansas, 1967.

Koenig, C. H. Precision teaching with emotionally disturbed children. Unpublished master's thesis, Univ. of Kansas, 1967.

Lindsley, O. Direct measurement and prosthesis of retarded behavior. Journal of Education, 1964, 147, 62-81.

Lucas, M. S. & Jones, R. L. Attitudes of teachers of mentally retarded children toward psychological reports and services. Journal of School Psychology, 1970, 8, 122-130.

Madsen, C. H., Becker, W. C. & Thomas, C. R. Roles, praise, and ignoring: Elements of elementary classroom control. Journal of Applied Behavior Analysis, 1968, 1, 139-150.

Peterson, D. R. . The clinical study of social behavior. New York: Appleton-Century-Crofts, 1968.

Weick, K. E. Systematic observational methods. In G. Lindzey & E. Aronson (Eds.) The Handbook of Social Psychology, Vol. 2. Reading, Mass.: Addison-Wesley, 1968.

Wright, H. F. Observational child study, In P. H. Mussen (Ed.) Handbook of research methods in child development. New York: Wiley & Sons, 1960.